

“Protective Thin Films against Liquid Metal Embrittlement”

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We present an experimental study of deposition of thin films designed to prevent liquid metal embrittlement caused by gallium and its alloys. This work had direct implications for the protection of cooling systems using liquid metal as coolant used in e.g. particle accelerators, nuclear reactors or computers.

Thin films were deposited by plasma enhanced physical and chemical vapor deposition. The composition and the structure of the sputtered films were analyzed with SEM microscopy and X-ray diffraction method, while the thickness and surface maps were obtained using a Contact Profilometer. We also performed a static test of interaction between protective thin films and liquid metal coolant. From these experimental investigations, we determined the list of influent parameters and their optimal values on the sputtering deposition to obtain the most resistant film compositions.